the trunnion remains stationary relative to the carrier. As in the case of the ball joint **80** of FIG. **4**, the trunnion connection accommodates bending of the torque frame arms in the tangential direction without imposing any twist or torsional deflection on the carrier.

The axial positioning of the pivotable joint also contributes to the performance of the drive system of the present invention. FIG. **6** illustrates, in simplified form, a planet carrier **30** rotating in direction R about the central axis **14**. A distributed driving force **110**, symmetrical about the axial midpoint **112** of the planet gears **28**, represents the force conveyed to the carrier by the planet gear orbital motion. The distributed driving force, which urges rotation of the carrier and, therefore, of the output gear assembly, can be represented by a resultant driving force **114** acting on the carrier at a location corresponding to the axial midpoint **112** of the planet gears. The carrier also experiences an individual reaction force **118** at each location **116** corresponding to the axial and circumferential position of each pivotable joint (not shown). The pivotable joints are axially positioned at locations **116** so that their individual reaction forces **118** all lie on a common plane perpendicular to the central axis **14** and located at the axial midpoint **112** of the planet gears. Consequently, the net resultant reaction force **120** corresponding to the individual reaction forces **118** also acts at the axial midpoint **112**. The axial coincidence of the resultant reaction force **120** and the resultant driving force **114** at the axial midpoint **112** ensures that the carrier does not experience torsional deflection. If the axial coincidence were absent, for example, if the joints are placed so that their resultant reaction force **120'** is axially separated by a distance S from the resultant driving force **114**, the carrier will be subject to a twisting influence tending to diminish the benefits of the spherical bearing.

FIG. **7** illustrates staggering of the joint positions **116** forward and rearward of the midpoint **112**. The distributed driving force **110**, symmetrical about the axial midpoint **112** of the planet gears, urges rotation of the carrier and, therefore, of the output gear assembly. The distributed driving force can be represented by a resultant driving force **114** acting on the carrier at a location corresponding to the axial midpoint **112** of the planet gears. Circumferentially neighboring joints (not shown) are positioned at locations **116'**, forwardly offset from the midpoint **112** by a distance d and **116"** rearwardly offset from the midpoint by an equal distance d. Because of the circumferentially alternating positioning of the joints at equal distances forward and rearward of the midpoint **112**, the corresponding individual reaction forces **118'** and **118"** yield a resultant reaction force **120** acting at the midpoint **112** and axially coincident with the resultant driving force **114**. The axial coincidence of the resultant reaction force **120** and the resultant driving force **114** at the axial midpoint **112** isolates the carrier from torsional deflection.

In the foregoing disclosure of the best mode for carrying out the invention, the sun gear assembly **50** (FIG. **2**) is the input gear assembly, the planet gear assembly **56** is the output gear assembly, and the ring gear assembly is stationary. Those skilled in the art will appreciate that any one of these three gear assemblies can be the input, either of the remaining two gear assemblies can be the output and the remaining gear assembly can be stationary. For example, in one arrangement the planet carrier is stationary and the ring gear rotates. In this arrangement, the sun gear assembly is the input gear assembly, but the ring gear assembly, rather than the planet gear assembly, is the output gear assembly. This gear arrangement requires the ring gear support structure **54** to be rotatable about the central axis **14**, and the planet carrier **30** to be stationary. In this arrangement, the torque frame connects the planet carrier, by way of pivotable joints as described hereinabove, to a stationary component, for example, the nonrotating support structure of a gas turbine engine, for reacting the torque being conveyed through the gear train. The distributed driving force **110** and its resultant **114** are still present but do not cause rotary motion of the carrier.

Geared drive systems can also be arranged so that one of the sun gear assembly, ring gear assembly, and planet gear assembly is an input gear assembly but that both of the remaining gear assemblies are output gear assemblies. This single input, dual output arrangement also benefits from the present invention provided the planet carrier is connected to the torque frame proximate its first end with pivotable joints as described hereinabove.

The best mode for carrying out the invention uses bihelical gears and a journal bearing arrangement to support the planet in the carrier. However, other gear types and bearing arrangements can be used without departing from the spirit and scope of the present invention.

Although this invention was described in the context of geared axial flow gas turbine engines, it is applicable to other machines that transmit torque through a planetary gear train.

The invention may be embodied in still other forms without departing from the spirit or essential character thereof. The embodiments of the invention discussed above are, therefore, illustrative and not restrictive, the scope of the invention being set forth by the appended claims rather than the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced thereby.

Having thus described the invention, what is claimed is:

1. A geared drive system for a bladed propulsor, comprising:

a planetary gear train including

a sun gear assembly comprising a sun gear,

a ring gear assembly comprising a ring gear, a planet gear assembly comprising a plurality of planet gears mounted in a planet carrier and disposed mechanically intermediate of and in meshing engagement with the sun gear and the ring gear, the planet carrier having a forward end plate and a rear end plate abuttingly mated to each other, the abutting contact between the plates extending over a substantial portion of the circumference of the carrier, the forward end plate also having a plurality of apertures,

wherein one of the sun gear assembly, ring gear assembly, and planet gear assembly is an input gear assembly receiving torque from a source thereof and at least one of the remaining of the sun gear assembly, ring gear assembly and planet gear assembly is an output gear assembly for delivering the torque to a load; and

a torque transfer structure having a first end terminating in a series of discrete, independently flexible arms, each arm having a proximal end and a distal end, each arm projecting axially through a corresponding end plate aperture, the distal ends of the arms being joined to the planet gear assembly by a plurality of joints, at least a portion of the distal end of each arm being at a radius greater than that of the planet gear axes, each of said joints being, with respect to a load path through the gear train, mechanically intermediate the torque transfer structure and the planet gear assembly wherein each